

REMARKS

Claims 1, 2, 4-6 and 8-16 are pending in the application. Claims 1, 2, 4-6, 8 and 9 have been amended. Claims 3 and 7 have been canceled without prejudice or disclaimer. Claims 15 and 16 are newly added. Reconsideration of this application is respectfully requested.

The Office Action has objected to the specification as not in conformance with the U.S. format. The specification has been amended at pages 1 and 2 to provide the appropriate section headings. Accordingly, it is submitted that the amendment obviates the objection to the specification and, therefore, that the objection should be withdrawn.

Claim 1 has been amended to remove the "characterized in that" language and to incorporate the "grease filter" language of claim 3, which has been canceled.

Claims 2, 5 and 6 have been amended to correct antecedent problems. Claims 8 and 9 have been amended to change "wherein" language to "further comprising".

The Office Action rejects claims 1 and 2 under 35 U.S.C. 102(b) as anticipated by French Patent No. 2,705,766 to Sylvain, hereafter Sylvain. A copy of an English translation of Sylvain, which has been obtained by Applicant, is enclosed herewith.

This rejection is inapplicable to independent claim 1, which has been amended to incorporate the "grease filter language of claim 4. Sylvain lacks a grease filter and, therefore cannot anticipate amended claim 1.

For the reason set forth above, it is submitted that the rejection of claims 1 and 2 under 35 U.S.C. 102(b) as anticipated by Sylvain is inapplicable and should be withdrawn.

The Office Action rejects claims 1, 8 and 12 under 35 U.S.C. 102(b) as anticipated by Japanese Patent No. 55-63,329 to Nobuto, hereafter Nobuto.

Nobuto lacks a grease filter as claimed in amended independent claim 1 and, therefore, cannot anticipate claim 1.

For the reason set forth above, it is submitted that the rejection of claims 1, 8 and 12 under 35 U.S.C. 102(b) as anticipated by Nobuto is inapplicable and should be withdrawn.

The Office Action rejects claims 3-7 and 9 under 35 U.S.C 103(a) as unpatentable over Sylvain in view of Japanese Patent No. 55-110835 to Nitta, hereafter Nitta. This rejection is moot as to claims 3 and 7, which have been canceled.

As discussed above, independent claim 1 has been amended to incorporate the grease filter language of claim 3, which has been canceled.

Nitta has been cited as showing a filter 12, which the Examiner alleges is a grease filter and mounted on an upstream side of catalytic converter 12. However, neither of these allegations is clear from Nitta's drawing or from the English abstract and constitution provided with the Office Action. In fact, it appears that the filter 12 is mounted downstream of catalytic converter 11 and not upstream as recited in amended independent claim 1.

Because the teaching of Nitta cannot be discerned from the drawing and the provided abstract and constitution, a prima facie case of obviousness has not

been made. Should the Examiner persist in the rejection, it is respectfully requested that the Examiner provide an English translation of Nitta in its entirety and rely on the underlying document and not an abstract. See *In re Jones*, 62 USPQ2d 1206, 1208 (Board of Appeals, 2001), which states that “abstracts often are not written by the author of the underlying document and may be erroneous” and that “the preferred practice is for the examiner to cite and rely on the underlying document”.

Applicant traverses the Examiner’s allegation that the subject matter recited in claims 4-6 is a “matter of design choice obvious to one of ordinary skill in the art at the time the invention was made”. The Examiner cites no evidence in support of any of the catalytic converter, grease filter and baffle plate arrangements recited in claims 4-6. These arrangements are indeed alternate embodiments of the present invention, shown in the various figures of the application and claimed in separate claims. As alternate embodiments, claims 4-6 are entitled to an examination that cites evidence in support of a rejection.

For the reason set forth above, it is submitted that the rejection of claims 1, 4-6 and 9 under 35 U.S.C. 103(a) is erroneous and should be withdrawn.

The Office Action rejects claims 1 and 10-14 as unpatentable over German Patent No. 4, 139,904 A1 to Lutz, hereafter Lutz, in view of Sylvain.

The Examiner alleges that Lutz discloses the invention substantially as claimed without setting forth the manner in which the elements recited in the claims correspond to the elements of Lutz. Again, the abstract is furnished in English and the underlying document is furnished in a foreign language (German). Should the Examiner persist in the rejection, it is respectfully requested that the Examiner provide an English translation of Lutz in its entirety and rely on the underlying document and not an abstract. See *In re Jones*, 62 USPQ2d 1206, 1208 (Board of Appeals, 2001), which states that “abstracts often

are not written by the author of the underlying document and may be erroneous" and that "the preferred practice is for the examiner to cite and rely on the underlying document".

Based on the unreliable abstract, it appears from the drawing that Lutz's catalytic converter is not mounted upstream of the fan, but rather is mounted downstream of the fan. Moreover, it further appears that Lutz's catalytic converter is not mounted on the baffle plate, but rather is mounted about the periphery of the fan. Thus, it appears that Lutz's oven is of an entirely different operating principle than that of Sylvain such that one of ordinary skill in the art would not have been motivated to make the substitution of Sylvain's catalytic converter mounting into Lutz's oven.

Also based on the unreliable abstract, it appears that Lutz does not disclose a grease filter. Since neither Lutz nor Sylvain discloses a grease filter, the suggested combination does not meet all of the elements recited in amended independent claim 1.

For the reason set forth above, it is submitted that the rejection of claims 1 and 10-14 under 35 U.S.C. 103(a) is inapplicable and should be withdrawn.

The Office Action cites a number of patents that were not applied in the rejections of the claims. These patents have been reviewed, but are believed to be inapplicable to the claims.

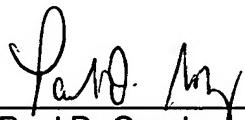
Newly presented claim 15 recites that the fan, the baffle and the oven chamber are located to circulate air in a path that includes the baffle, the fan, the oven chamber, the grease filter and the catalytic converter. Newly presented claim 16 recites that the baffle plate is positioned for air to flow around one or more edges thereof into the oven chamber and to return to the fan via the grease filter, the catalytic converter and the aperture. None of the cited references

discloses the combinations recited by claims 15 and 16. Accordingly, it is submitted that claims 15 and 16 distinguish from the cited art and are, therefore, allowable.

It is respectfully requested for the reasons set forth above that the objection to the specification be withdrawn, that the rejections under 35 U.S.C. 102(b) and 35 U.S.C. 103(a) be withdrawn, that claims 1, 2, 4-6 and 8-16 be allowed and that this application be passed to issue.

Respectfully Submitted,

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Paul D. Greeley
Reg. No. 31,019
Attorney for Applicant
Ohlandt, Greeley, Ruggiero & Perle, L.L.P.
One Landmark Square, 10th Floor
Stamford, CT 06901-2682
(203) 327-4500

The present invention relates to a device permitting an effective destruction of gases and smoke produced on the walls of a domestic oven during the cooking of food or during the phase of cleaning by high-temperature pyrolysis.

It is known that in an oven of this type, cooking of food induces the formation of multiple deposits on the inner walls of the muffle which defines the cavity where this food is positioned inside the oven chamber, in particular fatty residues, rich in hydrocarbons, incompletely consumed, and then the cooking process produces a release of vapor or smoke which contains a fraction--that is sometimes quite large--of more or less harmful volatile elements, in particular carbon monoxide, these elements presenting a risk if they are spread in large quantity into the surrounding atmosphere. Moreover, during the phase of oven cleaning by pyrolysis, which consists of bringing the oven to high temperature to burn or totally consume fat or other residues, the flow of smoke and harmful gases is increased and therefore, these gases must be transformed into a higher stage of oxidation where they are made harmless, for example, carbon monoxide CO, being transformed into carbon dioxide CO₂.

For this purpose, and in order to conform to existing standards, the majority of domestic ovens conduct a catalytic transformation operation of these gases or smoke, by passing the gases through a pellet of catalytic material assuring, at the operating temperature of the oven and especially during pyrolysis, the destruction of harmful gases before these gases are discharged outside the oven chamber, without danger for the environment.

In classical manner, a catalysis unit made of a porous material is used for this purpose, which is coated or impregnated with a precious metal such as platinum or rhodium, this unit being pierced with a plurality of passages for the flow of gases or smoke, and housed in a chimney, generally vertical, which connects the top or sometimes the sides of the muffle to a gas-collecting space, confined between this muffle and the inner wall of the oven chamber, a fan being advantageously provided in this space or connected to it, to blow in air that entrains the gases or smoke, bringing them to the chimney outlet, before discharging the smoke outside the oven, generally in the front face of the chamber, above or next to the sides of the muffle access door, provided in the latter.

By way of indication, for more details concerning the particular structure of such ovens, one can refer to French patents 91 02087 and 91 02088 of February 21, 1991, filed in the name of the Applicant Company, which refer to structures of this type, having various enhancements to improve the extraction of smoke and the action of the catalyst, in view of obtaining, notably, a more effective oxidation.

But in solutions of this type, it is observed that this oxidation is not complete, especially if grease buildup or other stains on the walls of the oven are significant; the catalysis unit does not permit perfectly and completely treating the large flow of smoke that is then produced, both during normal usage of the oven and even more so during the pyrolysis cleaning phase.

Finally, it is observed that, despite the great care taken in the manufacture of the oven, in particular at the level of the part of the chamber that receives the

pivoting door giving access to the inside of the muffle and closing the latter during use, the seal is not total, so that a not necessarily negligible fraction of the smoke produced can escape from the oven without passing through the catalysis unit, notably by going through the passages provided for mounting the heating elements, the attachment screw holes, or possible clearances at right angle with joints, etc.

The present invention concerns a device for the oxidation of gases and smoke for a cooking oven that eliminates these disadvantages by permitting a practically total elimination, or in any case a very considerably improved elimination of the toxic gases and smoke produced by the combustion of fats, before the completely oxidized products of this reaction are finally discharged out of the oven chamber.

For this purpose, the device for catalytic oxidation of gases and smoke in a domestic cooking oven having a muffle and receiving the food to be cooked, equipped with an access door, and in some cases with a connection chimney between this muffle and a space for collecting the oxidized gases and smoke, provided outside the muffle between the latter and the oven chamber in which this muffle is housed, and having a catalysis unit mounted in the chimney through which pass the gases and smoke originating from this muffle in the normal function of the oven or during the phase of cleaning its walls by pyrolysis at high temperature, the collection space opening out toward the outside of the chamber via evacuation vents, notably provided in the front face of the chamber, is characterized in that, in any one whatever of the walls of the muffle, a large

opening is provided in which a perforated plate is mounted, made of a catalytic material, this plate being designed so that the gases and smoke produced in the muffle pass through it under the effect of the aspiration created by the turbine of a fan positioned in a defined housing behind the back wall between the latter and a rear space belonging to the chamber, this wall being additionally provided with at least one and preferably a plurality of passages distributed around the opening receiving the perforated plate, so that the gases and smoke passing through the plate following aspiration of the turbine, are then sent back into the muffle through the passages of the back wall.

Preferably, but not exclusively, the wall of the muffle having the opening in which the perforated plate is mounted is the back wall of this muffle.

Also preferably, and in this particular embodiment, the turbine of the fan placed in its housing behind the back wall of the muffle operates constantly or intermittently during cooking and pyrolysis operations, so that it assures circulation in the muffle chamber, first entraining the gases and smoke by forcing them to pass through the perforated plate of catalytic material, before they are returned to the muffle through passages provided in this wall, these gases and smoke thus returning into the muffle being greatly oxidized under these conditions, and consequently having an already greatly reduced toxicity, in particular for the fraction of these gases that may in some cases escape the chamber through inevitable leakage lines.

According to one particular characteristic of the invention, the fan turbine is positioned just behind the perforated plate with its axis of rotation perpendicular to the plane of this plate.

Advantageously, the perforated plate is present in the form of a flat disk with circular profile, clamped or otherwise mounted in a metal collar extended by a support made in one piece with the back wall of the muffle, the plate being housed without play in the opening of the latter.

According to still another advantageous but non-exclusive characteristic, the passages created in the back wall of the muffle can be distributed into groups according to the four cardinal points around the axis of the plate. Moreover, the perforated plate of catalytic material can be provided with an electrical heating element, positioned in the immediate neighborhood of this plate, notably around the fan turbine, or may even be embedded in the thickness of the plate.

Other characteristics of a device for catalytic oxidation of gases and smoke in a domestic cooking oven will appear more clearly through the description that follows of one example of embodiment, given by way of indication and non-limiting, in reference to the attached drawings in which:

- Figure 1 is a schematic view in perspective of a cooking oven provided with a device according to the invention.

- Figure 2 is a cross-sectional view in larger scale of the back wall of the muffle of the oven of Figure 1 and the fan mounted behind this wall.

- Figure 3 is a surface view of the back wall of the muffle according to Figure 2.

In Figure 1, reference 1 designates the oven considered, taken as a whole, this oven notably containing, in a classical manner for this type of device, an outer chamber 2 and, mounted inside the latter, a muffle 3, in which food is cooked, notably by means of electrical heating elements (not shown). The nature, arrangement and control mode of these heating elements does not matter to the invention; the oven can be of the conventional heating type, preferably with stirring of air in the muffle. In addition, the oven may contain, in addition to the above-mentioned heating means, a source of high-frequency electric radiation, for microwave heating.

Muffle 3 is closed during use of the oven by a front door 4, joined to the corresponding face of the chamber; this door may have a window 5 permitting a view inside the muffle of the cooking of food introduced into the inner region 6 defined in this muffle.

Smoke or vapor produced during this cooking is extracted from the muffle through an evacuation conduit or chimney 7, connecting inner region 6 of the muffle with a bin 8, preferably with flattened profile, forming a collector and defined between two thin walls 9 and 10, respectively, creating a free space 11 between them in which a fan 12 operates, which is mounted in the rear part of the chamber opposite door 4 and where the end of chimney 7 emerges, opposite the end assuring the connection with the inside of the muffle 3. This fan 12 notably permits entraining the gases and smoke collected in space 11 by chimney 7, before ejecting these outside the chamber through an outlet opening 14 provided, according to diverse variants of embodiment, either in the front face

of the chamber above door 4, such as in the example more specifically considered, or in its rear face or below the muffle; this opening 14 may be formed of several separate vents or a single vent, preferably with a protection grid (not shown) in front of it.

In a manner also known in this type of oven, chimney 7 contains a catalysis unit 15, generally present in the form of a pellet of porous material or a material pierced with passage holes for smoke, vapor or other gases produced in the muffle, both in the period of normal functioning of the latter and in the phase of cleaning the inner walls of the oven by pyrolysis, which in the classical manner consists of bringing the interior of the muffle to very high temperature to assure a complete combustion of grease or other residues that were deposited on the walls of this muffle during previous cooking phases. Catalysis unit 15 has a coating or incorporates a precious metal of the platinum or rhodium type which facilitates oxidation of the smoke thus produced and permits in particular transforming carbon monoxide into carbon dioxide.

According to the invention, back wall 16 of the muffle 3 is arranged so that the oxidation of the gases, vapors or smoke thus produced in the oven is very notably improved and so that these gases, after having passed through catalysis unit 15 mounted in chimney 7 to be collected in collection space 11 before being discharged outside chamber 2, are rendered notably cleaner and thus have a very perceptibly reduced toxicity for the external environment.

For this purpose, in back wall 16, said wall being chosen by way of example without excluding variants that would consist of making the same

arrangements in another wall of muffle 3, a large opening 17 is created in which a support part 18 is mounted, having a circular collar 19 provided with a flange 19a permitting its attachment onto wall 16 and in which is clamped or otherwise immobilized a perforated plate 20, made of a material that can cause, at the operating temperature of the oven and especially in the pyrolysis phase, a catalytic transformation of these gases or smoke upon passing through this plate. The plate is positioned without play in opening 17.

Advantageously, the material of plate 20 is similar or identical to that of catalysis unit 15 and in particular incorporates a precious metal of the platinum or rhodium type, the plate being porous and pierced with a plurality of passages or even having a plurality of holes (not shown) distributed over its surface so as to thus divide the flow of gases and smoke as much as possible and thus increase the contact of the latter with the material of plate 20. As a variant or complement, this plate 20, and in some cases catalysis unit 15, can be provided with a heating element (not shown) permitting increasing their performance.

Behind back wall 16 is created an enclosed housing 21, defined between the rear part of this wall and a plate 22 belonging to chamber 2 of the oven, in which muffle 3 is positioned. Screws 23 and sleeves 24 respectively assure a mechanical connection between back wall 16 and plate 22, so as to permit mounting a turbine 25 of a second fan 13 inside housing 21, distinct from the first fan 12 blowing directly into space 11, and whose blades 26 are arranged so as to permit aspirating the gases or smoke inside the muffle through perforated plate 20 of catalytic material, such as diagrammed by the dashed-line arrows 27 in the

view of Figure 2. Electric coils permitting heating the catalyst of plate 20 can be positioned around turbine 25 or in some cases can be directly embedded inside the thickness of this plate.

The gases or smoke thus aspirated by turbine 25 in housing 21 thus undergo a transformation and in particular a notable oxidation upon passing through plate 20 before being returned to the inside of the muffle through a plurality of openings 28 created in back wall 16 of muffle 3, these openings being advantageously, in the example of embodiment considered but in a manner not exclusive in and of itself, distributed into groups according to the four cardinal points around the central axis 29 of plate 20, as can be seen more particularly in Figure 3.

Turbine 25 mounted in housing 21 just behind plate 20 is joined by a retaining nut 30 to axle 31 of fan 12, which [nut] crosses plate 22 of the chamber through a bearing 32 and turns in the latter on rollers such as 33, axle 31 extending perpendicularly to the plane of the plate. It is driven by a motor 34 housed beyond plate 22 in a casing 35 or other appropriate confinement communicating with collection space 11 by conduit 13, similar to what has been already specified with regard to Figure 1.

Collection space 11 is swept by the air flow produced by fan 12 which flows into the latter. Possibly, as shown in Figure 2, a casing 35 may be attached against plate 22 by screws 36 and spacer sleeves 37 (Figure 2), axle 31 driven by motor 34 having a second turbine 38 inside casing 35, designed to provide a scavenging air flow directed through a conduit 38a into space 11 along

the direction of arrow 39, so as to entrain, in a similar manner, the gases and smoke thus finally received in collection space 11 after having passed through plate 20 and/or catalysis unit 15.

Thus a device is created for the catalytic oxidation of gases or smoke produced in a domestic cooking oven of simple design that permits obtaining remarkable advantages when compared to solutions currently known in the prior art, notably due to the virtually complete oxidation realized for these gases and smoke. Notably, it is observed that the proposed solution permits reducing by nearly a factor of five the quantity of carbon monoxide released into the atmosphere during a pyrolysis operation during which grease residues and other stains on the inner walls of the muffle are treated while providing a very large flow of smoke.

Of course, it goes without saying that the invention is not limited to the example of embodiment especially described above, in reference to the attached drawings; on the contrary, it covers all variants.